



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/558,819	04/26/2000	Toshihiko Koseki	JA9-1998-0203US1	1693

7590 06/27/2003  
Anne Vachon Dougherty Esq  
IBM Corporation  
3173 Cedar Road  
Yorktown Heights, NY 10598

EXAMINER

PARKER, KENNETH

ART UNIT	PAPER NUMBER
----------	--------------

2871

DATE MAILED: 06/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/558,819

Applicant(s)

KOSEKI ET AL.

Examiner

Kenneth A Parker

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on 16 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

In response to applicant's request for clarification of the office action regarding the arguments with respect to claims 13-21 which were amended to remove the "lower bottom" and related language, this new office action is sent in place of the previous office action. As it has been subsequently realized that the language also was in other claims which had not been explicitly pointed out previously, and as the other aspects of problems relating the indefiniteness of the equations are now being explicitly addressed, this action is not made final. Art rejections have been changed for clarification and/or application of new references.

#### ***Claim Rejections - 35 USC § 112***

**Claims 1-27, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claims 6-11 employ the word "lower bottom column area", which has no known definition. As the equation is supposed to refer to a property of the spacer, and none of the other factors of the equation refer to the area of the spacer, it is assumed that this should actually be "the area of the spacer". If the language is referring to the column area, then the statement that the spacers have "a column occupancy ratio of..." does not make sense, as the ratio would not in any way relate to the spacer. In fact, it would look more like an inverse aperture ratio, something having nothing at all to do with the spacers.

Claims 12 and 20-27 have the language involving upper and or lower bottoms, which

Art Unit: 2871

applicant corrected regard claims 13-19, but did not do so with claims 12 and 20-27.

Claim 1-4 and 29 have equations giving numbers with no units. As the units can be chosen to be anything, these equations are indefinite.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claim 12, 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyazaki et al U.S. Patent # 5,978,061.**

Miyazaki et al discloses a liquid crystal device with a photosensitive resin in the non-display region. Regarding the level of taper, the reference shows tapers which appear to fit in the claimed range, and as the exact level of taper claimed cannot be determined, as best can be construed the taper of the reference meets that claimed.

**Claim 12, 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Hasegawa et al, U.S. Patent # 5,499,128.**

Hasegawa et al discloses a liquid crystal device with a photosensitive resin in

Art Unit: 2871

the non-display region. Regarding the level of taper, the reference shows tapers which appear to fit in the claimed range, and as the exact level of taper claimed cannot be determined, as best can be construed the taper of the reference meets that claimed.

**Claim 12, 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Kajita et al U.S. Patent #6,275,280.**

Kajita et al discloses a liquid crystal device with a photosensitive resin in the non-display region. Regarding the level of taper, the reference shows tapers which appear to fit in the claimed range, and as the exact level of taper claimed cannot be determined, as best can be construed the taper of the reference meets that claimed.

***Claim Rejections - 35 USC § 103***

**Claim 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al U.S. Patent # 5,978,061.**

Claim 6 is written to a device with a "column occupancy ratio", defined as the area of the lower bottom column area times the column density (understood to be the one over the number of rows), divided by the pixel area times 1000, of .05-.86. As there is no way to determine what constitutes a lower bottom region, any density would meet these limitation. However, *en arguendo*, the limitation could have been defined, the density of spacers was a well known result effective variable with too many blocking the light and too few giving insufficient support. As the selection of a result

Art Unit: 2871

effective variable was judicially determined to have been at least obvious, this limitation still would not patentably distinguish over the reference.

**Claim 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al, U.S. Patent # 5,499,128.**

Claim 6 is written to a device with a "column occupancy ratio", defined as the area of the lower bottom column area times the column density (understood to be the one over the number of rows), divided by the pixel area times 1000, of .05-.86. As there is no way to determine what constitutes a lower bottom region, any density would meet these limitation. However, *en arguendo*, the limitation could have been defined, the density of spacers was a well known result effective variable with too many blocking the light and too few giving insufficient support. As the selection of a result effective variable was judicially determined to have been at least obvious, this limitation still would not patentably distinguish over the reference.

**Claim 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kajita et al U.S. Patent #6,275,280.**

Claim 6 is written to a device with a "column occupancy ratio", defined as the area of the lower bottom column area times the column density (understood to be the one over the number of rows), divided by the pixel area times 1000, of .05-.86. As there is no way to determine what constitutes a lower bottom region, any density would meet these limitation. However, *en arguendo*, the limitation could have been

Art Unit: 2871

defined, the density of spacers was a well known result effective variable with too many blocking the light and too few giving insufficient support. As the selection of a result effective variable was judicially determined to have been at least obvious, this limitation still would not patentably distinguish over the reference.

**2. Claims 1-2, 4-8, 10-14, 16-19, 20-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shioda et al, U.S. Patent #6,299,949 in view of Kajita et al, U.S. Patent #6,275,280.**

**With respect to claims 1 –2 and 4,** Shioda et al discloses "a liquid crystal display device which comprises two substrate, a liquid crystal sandwiched and supported between the two substrate, and spacers, for maintaining a predetermined substrate substrate spacing, provided on at least one of the substrates in its portion where the liquid crystal sandwiched and supported, the spacers being formed of photocured resin layer the photocured resin layer having a Young's modulus, derived from a stress-strain curve, of not more than 10,000 MPa at 25 d. C. ( $=1,000 \text{ kgf/mm}^2 - \text{VL}$ ) and not less than 10 Mpa at 150 d. C. ( $= 1 \text{ kgf/mm}^2 - \text{VL}$ )" They also disclose, as another aspect of their invention, the spacers being formed of a photocured resin layer, wherein the photocured resin layer has a dynamic hardness value of 30 to 60 under load." See col.3, lines 14 -28. Lacking from the disclosure of Shioda et al is the exact range of value of DH and any value of HV. However, there are no units and therefore the value can be arbitrarily selected, this limitation is inherently met by any reference. Further, even if the DH had units, if those units were the same units as those of Shioda

Art Unit: 2871

et al. the limitation would be obvious over Shioda et al.. Shioda et al does not disclose the identical range of applicant with respect to the variable DH, however they disclose a range which either overlaps at the end point, or substantially close. As it has been judicially determined that overlapping ranges are at least obvious, the range of Shioda et al would have been obvious to one of ordinary skill over the claimed range. As to HV, Shioda et al disclose that the degree of plastic deformation is related to and described by DH. (See col.15, 1-25). In other words, the range of DH as defined by Shioda et al also defines a certain range of HV even though they do not disclose specific values. Moreover, since the range of DH, disclosed by Shioda et al is close or overlaps with those of the applicant, the same is true for VH (see the previous paragraph). However, there are no units and therefore the value can be arbitrarily selected, this limitation is inherently met by any reference. Also, it was well known in the art that the dynamic hardness should fall within a certain hardness value range "from the viewpoint of avoiding dynamic instability". See col.13, lines 1-14; col.23, lines 1-7. Since plastic deformation is defined by dynamic hardness (see col.15, lines 1-16) it also should fall within a certain range to avoid the dynamic instability. They also disclose: "the storage modulus as determined as dynamic viscoelasticity measurement (=elastically deformable component, that is a component of which the shape can be returned to the original shape) should be not more than specified value in the above temperature range, provided that the storage modulus should be not than the certain value from the viewpoint of avoiding dynamic instability. Further the loss tangent (=proportion of the deformation; the larger this proportion, the larger the amount of the



Art Unit: 2871

plastically deformable component) should not be more than the specified value. Further, the Young's modulus derived from a stress-strain curve should be not more than the specified value at 25 d. C., provided that the Young's modulus should be not less than a certain value from the viewpoint of avoiding dynamic instability. Further, the dynamic hardness should fall within a certain hardness value range." See col.13, lines 1-33, col.2, line 55 -col.3, line 28. Shioda et al fail to specifically teach spacers in non-display region. However it was notoriously well known to employ spacers in the non-display region for preventing reducing the aperture, and would have been obvious for that reason.

**With respect to claim 5, Shioda et al disclose:** "After preparation of liquid crystal cells, a reliability test is carried out. When the coefficient of thermal expansion of the resin constituting the spacer is larger than that liquid crystal, the cell cannot cope with the thermal expansion the liquid crystal. In this case the pressure within the cells becomes lower than the atmospheric pressure, and air enters through the sealed portion, often leading to a foaming phenomenon. Therefore, the properties required of the spacer are those of liquid crystal devices in the temperature range of -40 d.C. to 80 d.C., that is in such a temperature range that reliability is generally required of the liquid crystal devices.

**With respect to claims 6-8 and 10-11,** they are written to a device with a "column occupancy ratio", defined as the area of the lower bottom column area times the column density (understood to be the one over the number of rows), divided by the pixel area times 1000, of .05-.86. As there is no way to determine what constitutes a

Art Unit: 2871

lower bottom region, any density would meet these limitation. However, *en arguendo*, the limitation could have been defined, the density of spacers was a well known result effective variable with too many blocking the light and too few giving insufficient support. As the selection of a result effective variable was judicially determined to have been at least obvious, this limitation still would not patentably distinguish over the reference.

**Shioda et al** teaches: "The spacer may be disposed in a proper density, such as a density of one spacer per four pixel or one spacer per one pixel. The spacer density in terms of volume density is generally 0.1 to 5%, preferably 0.3 to 2%, from the viewpoint of the function of the spacer. When the volume density of the spacer exceeds the upper limit of the above density range, the pouring efficiency in the step of pouring the liquid crystal is unfavorably lowered. On the other hand, a smaller volume density than the lower limit of the above volume density range is causative of the deformation of the spacer at the time of cell assembling. The surface area density of the spacer is generally 50 to 2,000  $\text{m}^2/\text{mm}^2$ , preferably 500 to 1,000  $\text{m}^2/\text{mm}^2$ . A surface area density smaller than the lower limit of the above surface area density range is causative of the deformation of the spacer at the time of cell assembling, while when the surface area density exceeds the above surface area density range, the pouring efficiency in the step of pouring the liquid crystal is unfavorably lowered. See col.16, lines 25-42. When one spacer is provided for each size of 100  $\mu\text{m}$  x 300  $\mu\text{m}$  in color pixel, about 33 spacers can be formed in 1 mm. This value is smaller than 100 spacers/mm, the number of spacers per mm in the case of the conventional technique." See col.16, lines 50-54. Lacking from the disclosure is exact range of value of the spacer density. Shioda et al

do not disclose the identical range of the applicant with respect to the spacer density, however, they disclose a range which either overlaps or substantially close. As it has been judicially determined that overlapping ranges are at least obvious, the range of Shioda et al would have been obvious over claimed range.

**2. Claims 13-14, 16-22, 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shioda et al, U.S. Patent #6,299,949 and Kajita et al, U.S. Patent #6,275,280 as applied above, and further in view of Miyazaki et al U.S. Patent # 5,978,061 and Hasegawa et al, U.S. Patent # 5,499,128.**

**With respect to claim 12-14, 16-22, 24-27,**

Shioda et al disclose that "the shape of the spacer formed by development may be, for example, a trapezoid having a height 2 to 10 m, and the edge of the spacer may be a round spherical form or an angular rectangular form." See col.16, lines 43-49. The three secondary references as show figures illustrating tapers in the claimed range. Therefore it would have been obvious to one of ordinary skill to have eh taper in the claimed range which was common in the art. Additionally, the rejection can be viewed in the reverse with any of the secondary references with specific tapers modified by employing the spacer of Shioda et al for the benefit of the ability to maintain the desired cell gap and inhibit foaming.

***Allowable Subject Matter***

**Claims 3, 9,15, and 23 would be allowable if rewritten to overcome rejection(s) under 35 U.S.C. 112, second paragraph set forth in this Office action (if present), and to include all of the limitations of the base claim and any intervening claims.**

The following is an examiner's statement of reasons for allowance: With several variables narrowly claimed, it would not be reasonable to assert that the values are selection of a result effective variable. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

Applicant's arguments filed have been fully considered but they are not persuasive.

Applicants amendment regarding the upper bottom and lower bottom ratio unfortunately did address all instances of the language. As discussed in the previous office action, the language "upper bottom" and "lower bottom" are genuinely not understood. Applicant is invited to contact the examiner to discuss these issues and attempt to reach an understanding of the language and technology employed in this application.

Regarding characteristics of the spacers, the closeness of overlapping ranges, issues of design choice render the claims not allowable. Additionally applicant has not met the burden of showing a non-obvious difference (needed where prior art disclosed devices of the same structure but silent on a characteristic). As many of the references discuss the optimization of the same or related parameters for preventing bubbling, assertions that the selection of these characteristic gives the benefit of preventing bubbling is insufficient to show non-obviousness. Additionally, applicant needs to show novelty, something applicant has not yet argued.

Regarding applicant's argument involving the density ratio, please keep in mind that selection of a well known matter of design choice has been judicially determined to have been obvious. Here, as no new or unexpected result can be construed as occurring. This is because with different substrate thickness and sizes, the values would be different. For example, a tested ratio that gives good results with a 1 inch display having a thick substrate would be expected by those of ordinary skill to be very different from that for a 50 inch display with a thin substrate such as a 1.1mm. Also the appropriate ratios would be determined by what type of liquid crystal used, for example, the ratio appropriate for ferroelectric would be very different than the ratio appropriate for nematic or a polymer network. Therefore the ratio by itself must be a design choice. Please also note, that the reference Shioda and Kajita et al do discuss the ratio of spacers describing the tradeoffs in the selection (described in the office action above), as do many of the other prior art references of record.

Applicant discusses the circular diameter and or lengths of the spacers as being in claims 12-19, a feature which the examiner does not see in the claims, only "top and bottom" bottoms, language discussed as being not understood, and yet not clarified by applicant.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Many additional reference have been cited which teach various features of the claimed inventions and could be used to apply rejections. In particular, Miyazaki et al, Morimoto et al, Shigeta et al, and Saito et al all discuss selection of the spacer density and material characteristics being selected to minimize bubbles (sometimes described as foaming).


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth A Parker whose telephone number is 703-305-6202. The examiner can normally be reached on 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0956.

Application/Control Number: 09/558,819  
Art Unit: 2871

Page 14



Kenneth A Parker  
Primary Examiner  
Art Unit 2871

June 25, 2003